

REMARKS

Claims 1-18 are pending in the application. Claims 1-11, 13, 14, and 16-18 stand rejected. Claim 1 is an independent claim.

At the outset, Applicant notes with appreciation the indication in the Office Action that claims 12 and 15 recite allowable subject matter.

Claims 1-4, 7, 9, 13-14 and 16-18 stand rejected under 35 U.S.C §103(a) as allegedly being obvious over Watanabe *et al.* (U.S. 6,701,088) (“Watanabe”) in view of Xiong *et al.* (U.S. Pub. 2002/0118421) (“Xiong”). Claims 5-6, 8, and 10-11 stand rejected under 35 U.S.C. §103(a) as allegedly being obvious over Wantanabe in view of Xiong and further in view of Nishihara *et al.* (U.S. Pub. 2002/0018468) (“Nishihara”). Applicant respectfully traverses all grounds of rejection for the reasons indicated herein below.

In order for a claim to be rejected as obvious under section 103, there is required to be a showing that the prior art references, alone or in combination, teach all the features in the claims (*In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)), including those in functional language (*In re Schreiber*, 128 F.3d at 1478), and/or those features as combined in the claims would have been within the ordinary skill in the art (*KSR International Co. v. Teleflex Inc. et al.*, No. 04-1350, U.S. Supreme Court, decided April 30, 2007).

In a brief overview, the presently claimed invention provides an optical router that exchanges the data traffic of an IP packet at high-speed, suitable for an Ethernet frame in units of optical frames, and overcomes the limitations of electro-optic router access methods and high-speed IP router access methods of the prior art. In addition, the presently claimed invention solves the problems of a variable wavelength converter and an optical-fiber delay line buffer by using an electric buffer, and facilitates signal performance monitoring and signal reproduction of

an optical signal. Moreover, the presently claimed invention solves the problems of speed and degree of expansion of an electric switch by using an optical switch having a switching speed of several nanoseconds, which distinguishes from a high-speed IP router access method of the prior art (claim 1 recites in part: “an optical switch configured to perform a high-speed switching of the optical frames output from the interface”).

In addition, claim 1 recites in part an edge traffic aggregator including an ingress part and an egress part, the ingress part being “configured to convert IP packets input from the IP router in topical frames, and the egress part configured to convert the optical frames into IP packets” and to transmit the converted packets to the lower IP router” (emphasis in boldface and underlining added). The edge traffic aggregator recited in present claim 1 solves the problems associated with the limited capabilities regarding forwarding and switching speed of conventional high-speed IP routers by converting a packet into an optical frame using the edge traffic aggregator and performing a switching operation.

In other words, while conventional IP routers require a several tens of Mp/s as a forwarding speed, the use of the edge traffic aggregator as recited in claim 1 can reduce the time by several hundred Kp/s to several Mp/s by switching in units of optical frames of predetermined length, thus reducing the burden of router processing. Furthermore, while in a conventional device, several tens of IP routers are required to constitute a node, which requires a capacity of Tb/s or more. In contrast to conventional IP Routers, the optical router as presently claimed provides several advantages over conventional IP routers, one of which is that the number of elements that constitute the node can be reduced to a single structure having a capacity of Tb/s or more. Another advantage of the optical router as presently claimed is that the device can greatly reduce an upper area, construction, and operation costs of a node versus those constructed with

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conventional IP routers.

In contrast to present claim 1, the combination of Wantanabe and Xiong (with or without Nishihara) fails to disclose, suggest or provide motivation such that claim 1 would have been obvious to person of ordinary skill in the art at the time of invention. Also, the combination of elements recited in present claim 1 would not have been within the general skill of a person of ordinary skill in the art.

For example, with regard to the combination of references, Wantanabe fails to disclose a packet exchanger, but rather discloses a circuit exchanger having a path that is predetermined by the operator. In Wantanabe, the operator predetermines that the frame inputted to OBB-11 of Fig. 4 is outputted to the OPSIG/OTM CONV PART (12-1) through the REGEN RPTR (13-3) and the OP PATH SW PART (14). That is, the output port of the specific input frame is predetermined. In other words, this function indicates that Wantanabe operates the same as does conventional SDH equipment.

In contrast, in the presently claimed invention, the path for the packet exchanger is not predetermined. The header is the input frame that controls the path of the switch (claim 1 recites “a header processor arranged to recognize header information and to control the optical router”).

Accordingly, as Wantanabe is related to a conventional TDM exchanger, the combination of references fails to render any of the present claims to be obvious, as the present claims are directed to an optical router. In other words, Wantanabe discloses a large-capacity optical circuit exchanger while the presently claimed invention is directed to an optical router having a large capacity optical packet exchanger. For example, in the presently claimed invention, the header of the input frame is separated and transmitted to the header processing part, in which the header processing part detects the destination address of the header and controls the optical switch

fabric, and then changes the header and reinserts the header in the output part. In contrast, as Wantanabe discloses the process for the change of the section overhead and the path overhead, such a section overhead is not analogous to the header as recited in present claim 1.

With regard to Wantanabe, the IP packet router part (16) and IP/OP SIG CONV shown in Fig. 4 are the section performing the packet routing in order to send the inputted IP packet to the predetermined path.

In contrast to Wantanabe, the edge traffic aggregator of the presently claimed invention is distinguishable because in Wantanabe, the packet constitutes the payload, a path overhead, section overhead, and the speed of the payload and the speed of the header are the same.

However, in the presently claimed invention, the speed of the payload and the speed of the header are different. In other words, in the presently claimed invention, the headers are processed frame by frame in order to control the optical switch/buffer, etc.

Therefore, in the presently claimed invention, a frame is formed wherein the speed of the header is slower than the speed of the payload. As shown in Fig. 6, the header (Fig. 6-1) is transmitted earlier as much as the guard time (Fig. 6-3) than the data frame (Fig. 6-2). Moreover, the header (Fig. 6-1) and the data frame have different data speeds of R_H [b/s] and R_{DF} [b/s], respectively, and the speed of the data frame is the integer-number times the header frame speed. For example, if the data frame is 10 Gb/s, the header frame of 1.25 Gb/s can be used. Also, in order to recognize each starting point, the header and the data frame have respective preambles (Fig. 6-1-1, Fig. 6-2-1), respectively.

Furthermore, the combination of references also fails to disclose or suggest any of the claims because Xiong is related to an electro-optic-electric router using an optical-fiber delay-

line buffer whereas the presently claimed invention solves the problems associated with use of an optical fiber delay line buffer.

As shown in Fig. 1b of Xiong, the optical-fiber delay line buffer is the recirculation buffer (26) that is used for buffering the inputted packet. A more detailed example is shown in Fig. 15 of Xiong. Applicant respectfully submits that the optical-fiber delay line buffer as disclosed in Xiong (in combination with Wantanabe) is different than the electrical buffer recited in the present claims. The present specification at page 2 discloses the problems associated with optical-fiber delay line buffers. In addition, Xiong shows in Fig. 1b a switch control unit 32 is the same part as the header processing part. In other words, Xiong (in combination with Wantanabe) fails to disclose or suggest an edge traffic aggregator as recited in present claim 1.

In addition, the combination of Wantanabe and Xiong also fails to disclose or suggest the present claims as Wantanabe does not disclose any portion regarding the header processing part, as Wantanabe does not need a header processing part as presently claimed. Accordingly, the present claims are patentably distinguishable from Wantanabe (in combination with Xiong).

With respect to Wantanabe (in combination with Xiong), the OTM/OP SIG CONV part is the input part, and the OP SIG/OTM CONV PART is the output part, which is significant because the electric circuit converter in Wantanabe does not need a buffer, whether the optical-electrical conversion occurs or not, since the frame has to be transmitted to the predetermined path. At best, optical-electrical conversion might occur for inserting/deleting the path overhead and the section overhead in the frame. However, the present claimed invention requires buffering because of the optical packet exchanger, and uses the electrical buffer in order to solve the problem of the optical buffer.

With respect to Xiong (in combination with Wantanabe), Xiong does not disclose the optical/electrical conversion recited in the present claims. In other words, the electrical/optical process occurs for the payload. The optical/electrical conversion occurs only for the header process.

Finally, with regard to Wantanabe, there is an insertion part of the OPOH (Optical Path OverHead) and the insertion part of the OSHO on the IP/OP SIG CONV (17-2, 17-3), and the OP SIG/OTM CONV PART (12-1, 12-2), respectively. Thus, this purpose and method is distinguishable from the header insertion performed by the edge aggregator of the presently claimed invention. Furthermore, the structure and purpose of the header reinsertion part are quite different from the structure recited in the present claims.

For all of the above reasons, Applicant respectfully submits that none of the present claims would have been obvious to a person of ordinary skill in the art in view of Wantanabe and Xiong. In addition, Nishihara, in combination with Wantanabe and Xiong, still fails to disclose or suggest any of the present claims.

Other claims in this application are each dependent on independent claim 1 and believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual consideration of the patentability of each on its own merits is respectfully requested.

Reconsideration and withdrawal of all grounds of rejection under 35 U.S.C. §103(a) are respectfully requested.

To reject a claim under section 103, the United States Court of Appeals for the Federal Circuit required a showing of an unrebutted *prima facie* case of obviousness (*In re Rouffet*, 149 F.3d 1350, 47 USPQ2d 1453 (Fed. Cir. 1998)). According to the section 2143.03 of the

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Manual for Patent Examiner Procedure (the "MPEP"), the *prima facie* case cannot be established unless the references cited by the Patent Office, alone or in combination, teach all features recited in the claim (see also *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1970)).

Applicant respectfully submits that for the aforementioned reasons, the USPTO has not met the burden of showing a proper *prima facie* case of obviousness for any of the claims. Reconsideration and allowance of all the pending claims are respectfully requested.

Should the Examiner deem that there are any issues which may be best resolved by telephone, please contact Applicant's undersigned representative at the number listed below.

Respectfully submitted,



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(Signature and Date)